

CLAIMS

What is claimed is:

1. An optical filter a thermoplastic substrate supporting an organic, dielectric, optical film without substantially reducing the net integrated transmission properties of the film along an optical path

5 comprising:

a dielectric film including (i) repeating optical layers of at least two polymers having different refractive indexes from each other, (ii) an exterior surface material, (iii) a delamination threshold based on total thermal energy delivered to the film;

10 a thermoplastic substrate which is miscible with the exterior surface material of the film and which is disposed in the same optical path as said dielectric film; and

a polydisperse region comprising a mixture of said exterior surface material and said thermoplastic substrate located in the optical path between said film and said substrate, wherein said polydisperse region providing improved optical transmission along the optical path in the transition from said film to said thermoplastic substrate.

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2. The filter of claim 1, wherein said exterior surface material has a first melting temperature range and said thermoplastic substrate has a second melting temperature range that overlaps said first melting temperature range.

20 3. The filter of claim 1, wherein said thermoplastic substrate includes an organic absorber dye.

4. The filter of claim 3, additionally including a hologram disposed thereon.

5. The filter of claim 3, wherein said organic absorber dye is selected from the group consisting of a UV absorbing dye, a visible light absorbing dye, a cosmetic dye, a laser absorbing dye, a near infrared absorbing dye, an infrared absorbing dye and combinations thereof.
- 5 6. The filter of claim 5, additionally including a hologram disposed thereon.
7. The filter of claim 1, additionally including a hologram disposed thereon.
8. The filter of claim 1, further comprising an anti-reflection coating applied to the thermoplastic
10 material.
9. The filter of claim 8, wherein the anti-reflection coating is selected from the group consisting of a metal halide, a metal calcide, a rugate, a dielectric stack and combinations thereof.
- 15 10. The filter of claim 8, wherein the anti-reflection coating includes a metal.
11. The filter of claim 1, further comprising a hardcoat layer applied to the organic, dielectric optical film.
- 20 12. The filter of claim 11, additionally comprising an anti-reflection coating applied to the hardcoat layer.

13. The filter of claim 12, wherein the anti-reflection coating is selected from the group consisting of a metal halide, a metal calcide, a rugate, a dielectric stack and combinations thereof.

14. The filter of claim 12, wherein the anti-reflection coating includes a metal.

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15. The filter of claim 1, further comprising a hardcoat layer applied to the thermoplastic material.

16. The filter of claim 15, additionally comprising an anti-reflection coating applied to the hardcoat layer.

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17. The filter of claim 16, wherein the anti-reflection coating is selected from the group consisting of a metal halide, a metal calcide, a rugate, a dielectric stack and combinations thereof.

18. The filter of claim 16, wherein the anti-reflection coating includes a metal.

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19. The filter of claim 1, further comprising a hologram applied to the organic, dielectric optical film.

20. The filter of claim 19, additionally comprising a protective optical cap applied to the hologram.

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21. The filter of claim 20, additionally comprising an anti-reflection coating applied to the cap.

22. The filter of claim 21, wherein the anti-reflection coating is selected from the group consisting of a metal halide, a metal calcide, a rugate, a dielectric stack and combinations thereof.

23. The filter of claim 21, wherein the anti-reflection coating includes a metal.

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24. The filter of claim 20, comprising a metal dielectric stack disposed between the hologram and the cap.

25. The filter of claim 24, wherein the cap includes a concave side with the metal dielectric stack
10 sputtered onto the concave side.

26. The filter of claim 24, additionally comprising an anti-reflection coating applied to the cap.

27. The filter of claim 26, wherein the anti-reflection coating is selected from the group consisting
15 of a metal halide, a metal calcide, a rugate, a dielectric stack and combinations thereof.

28. The filter of claim 26, wherein the anti-reflection coating includes a metal.

29. The filter of claim 1, further comprising a protective optical cap with a metal dielectric layer
20 disposed between the cap and the organic, dielectric optical film.

30. The filter of claim 29, wherein the cap includes a concave side with the metal dielectric stack sputtered onto the concave side.

31. The filter of claim 29, additionally comprising an anti-reflection coating applied to the cap.

32. The filter of claim 31, wherein the anti-reflection coating is selected from the group consisting
5 of a metal halide, a metal calcide, a rugate, a dielectric stack and combinations thereof.

33. The filter of claim 31, wherein the anti-reflection coating includes a metal.